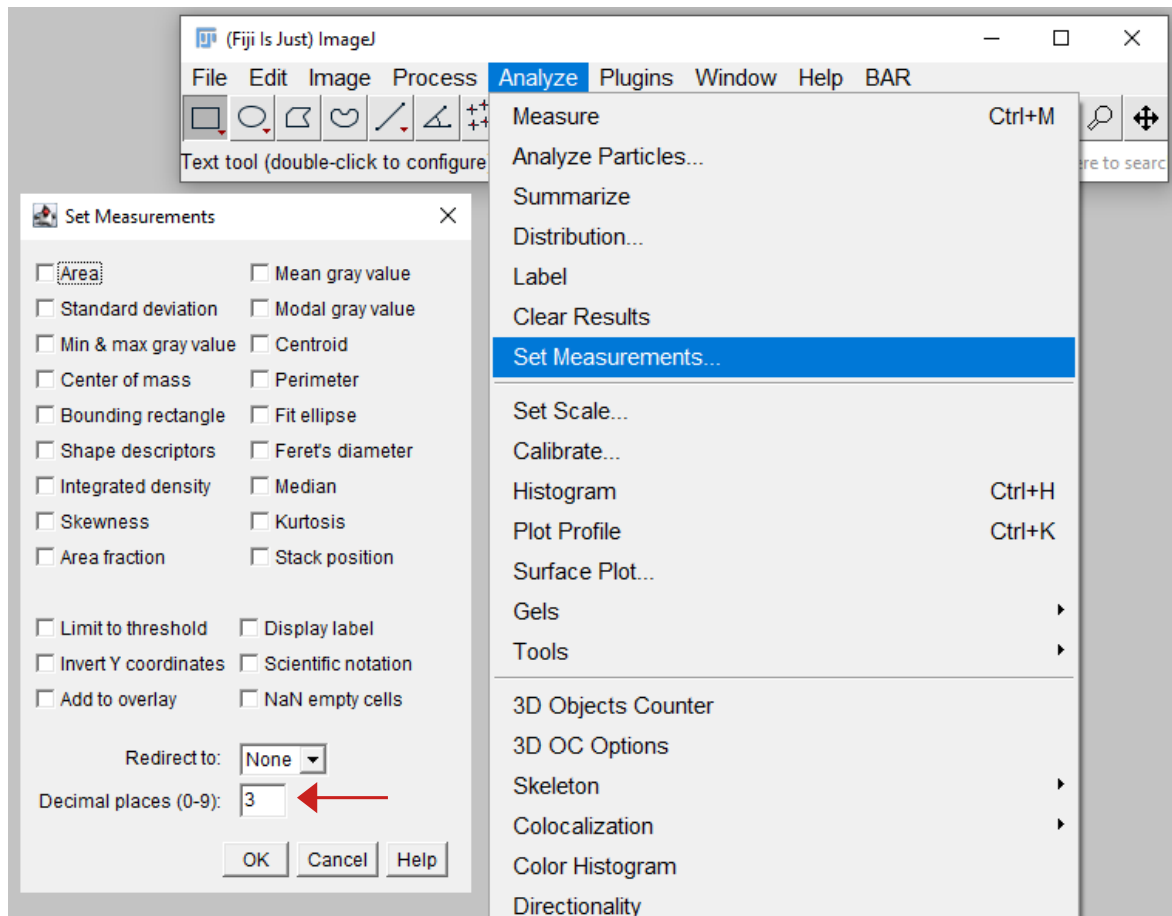


Tutorial: Exponential Smoothing 1D plugin (v1.0)

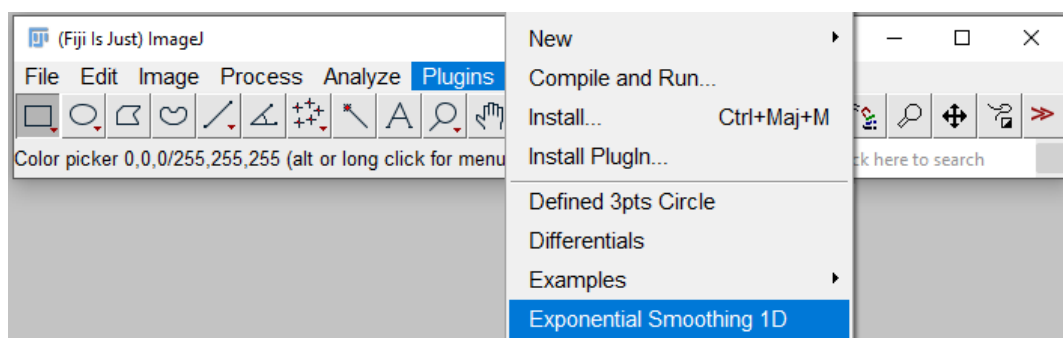
Description: to propose a tool able to apply an Exponential Smoothing (denoising filter) to results from a table. **Results:** two data tables and one plots graph.

Step 1: import the plugin in ImageJ/FIJI. Restart ImageJ/FIJI.

Step 2: set the Decimal place at the number required for your study.



Step 3: select the Exponential Smoothing 1D plugin. **This plugin does not required an image.**



Step 4: fill in the fields with the appropriate information, then click OK.

Exponential Smoothing 1D: settings

----- File -----

Source folder + source file (CSV): D:\Folder\Grey values Table.csv

Data column's name: Grey values

Number of rows: 3466 (a positive integer)

----- Abscissas' scale -----

Scale unit: µm

Scale value: 6.506506507 (a positive number)

----- Exponential Smoothing -----

Kernel: 7

Alpha: 0.200 range:]0 - 1[

----- Post-processing -----

Gain: 1.28 result multiplied by the gain

Offset: -3000 offset added to the result

OK Cancel

Number of rows: in the table (don't count the line used to label the columns; mind an eventually "0th" line!).

Scale value: the value, in the Scale unit (here µm for instance), of a pixel. The field must be filled in by a double type number: you can use, almost, as much digit as you want (in the field 6.507 should be enough...!, the very long number is given as an example).

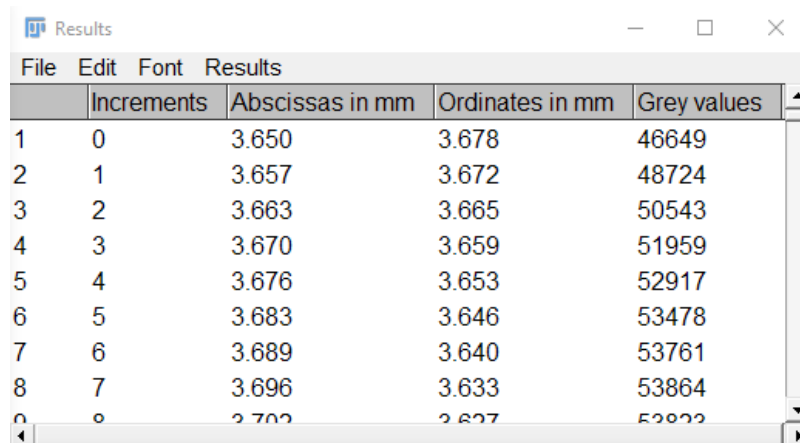
Exponential Smoothing:

- Kernel, the window's size used for the smoothing: 0; 3; 5; 7; 9; 11 (0 means no smoothing is applied on the data). The wider the window, the stronger the smoothing.
- Alpha, a double type number ranging from 0 and 1 (excluded), is the smoothing's "strength". The bigger the number, the stronger the smoothing.

Post-processing: the goal of the post-processing is, for the Smoothed data, to get an amplitude close to the Raw data (for comparison, etc.).

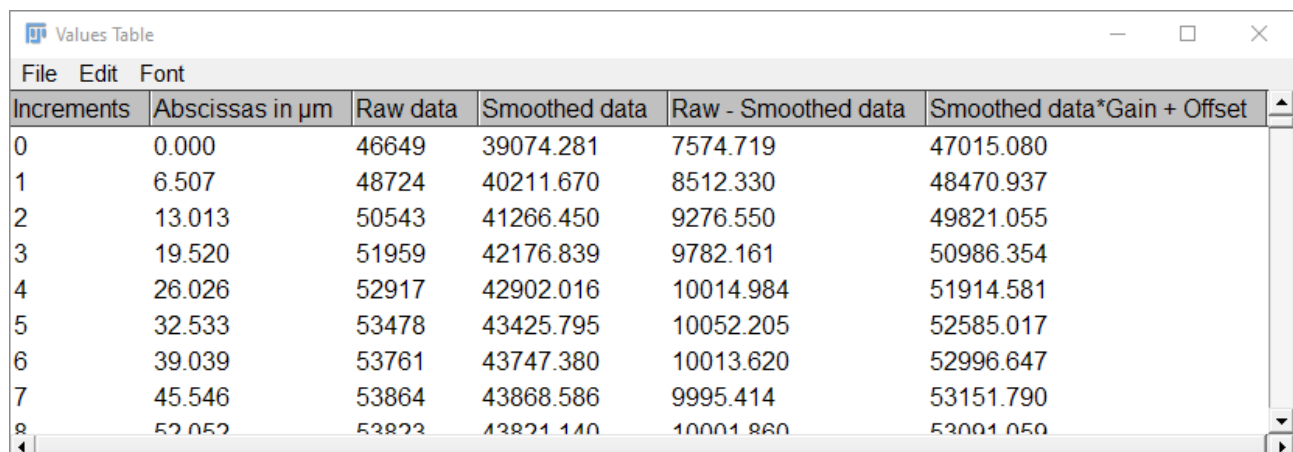
- the Gain multiplies the Smoothed data by the chosen gain value,
- the Offset adds to the result "Smoothed data*gain" the chosen offset value.

Results: two tables and one graph are generated.



	Increments	Abcissas in mm	Ordinates in mm	Grey values
1	0	3.650	3.678	46649
2	1	3.657	3.672	48724
3	2	3.663	3.665	50543
4	3	3.670	3.659	51959
5	4	3.676	3.653	52917
6	5	3.683	3.646	53478
7	6	3.689	3.640	53761
8	7	3.696	3.633	53864
9	8	3.702	3.627	53822

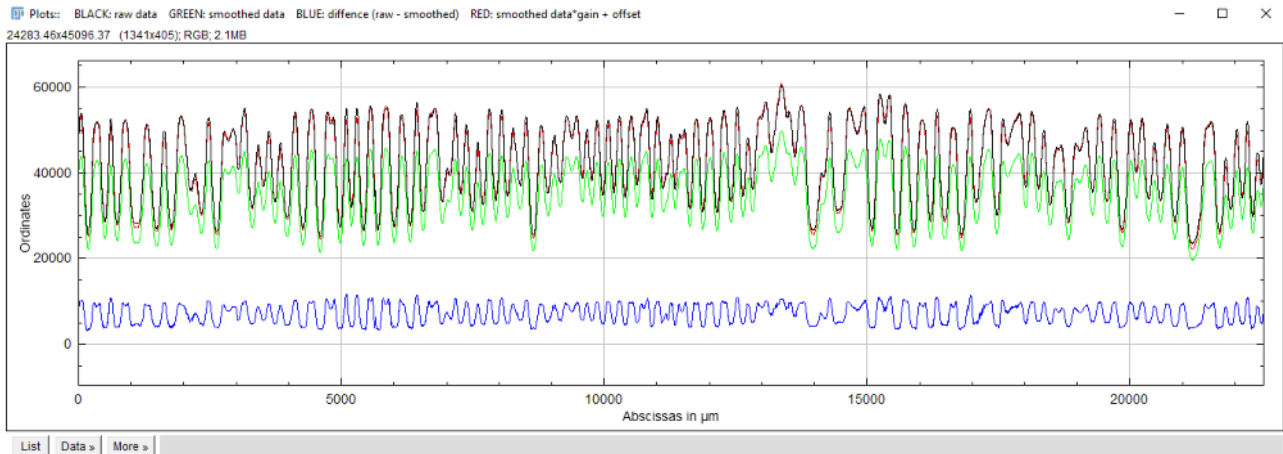
"Results" is as a reminder of the source file



Increments	Abcissas in µm	Raw data	Smoothed data	Raw - Smoothed data	Smoothed data*Gain + Offset
0	0.000	46649	39074.281	7574.719	47015.080
1	6.507	48724	40211.670	8512.330	48470.937
2	13.013	50543	41266.450	9276.550	49821.055
3	19.520	51959	42176.839	9782.161	50986.354
4	26.026	52917	42902.016	10014.984	51914.581
5	32.533	53478	43425.795	10052.205	52585.017
6	39.039	53761	43747.380	10013.620	52996.647
7	45.546	53864	43868.586	9995.414	53151.790
8	52.052	53822	43821.140	10001.860	53001.050

"Values Table" contains:

- the Abscissas (given in the scale unit) for each point,
- the Raw data (as reminder, from the source file and from the source column),
- the Smoothed data (by the Exponential Smoothing algorithm),
- the difference between the Raw and Smoothed data,
- the last column shows the Smoothed data enhanced by the gain and the offset values.



"Plots" shows, via a graph, the results of the plugin (cf. Values Table):

- the black line stands for the Raw (initial) values,
- the green line stands for the Smoothed data,
- the blue line stands for the difference between the Raw and Smoothed data (the goal is to visualize the impact of the smoothing on the Raw data and how much noise is removed),
- the red one shows the gain and offset enhanced Smoothed data.

Plugin limitation: developed on ImageJ 1.54 K (may not work properly on earlier version).

If this plugin is used in your application and research, please reference it in your paper.